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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,706	02/13/2004	Tsutomu Satou	121.1060	5696

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EXAMINER

LI, SHI K

ART UNIT	PAPER NUMBER
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2613

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/777,706

Applicant(s)

SATO ET AL.

Examiner

Shi K. Li

Art Unit

2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 25 is/are allowed.
- 6) ☒ Claim(s) 1-4, 10-13, 19-23 and 26-49 is/are rejected.
- 7) ☒ Claim(s) 5-9, 14-18 and 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 February 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>2/13/04, 9/29/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1 and 10 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for transmitting a particular signal for causing Brillouin scattering to occur and detecting the signal for disconnection, does not reasonably provide enablement for all conceivable structure for detecting disconnection in accordance with Brillouin scattering. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: means for generating Brillouin scattering. The detector itself does not differentiate whether the detected signal is due to Brillouin scattering or any other effects.
5. Claims 10-13 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: steps for generating Brillouin scattering. Without generating

Art Unit: 2613

Brillouin scattering, a detecting step cannot differentiate whether Brillouin scattering has occurred in the transmission line.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 10, 19-20, 26, 30 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. (K. Shimizu et al., "Coherent Self-Heterodyne Brillouin OTDR for Measurement of Brillouin Frequency Shift Distribution in Optical Fibers", Journal of Lightwave Technology, Vol. 12, No. 5, May 1994).

Regarding claims 1, 10, 19-20 and 26, Shimizu et al. teaches in FIG. 3 Brillouin OTDR system. The difference between Shimizu et al. and the claimed invention is that Shimizu et al. teaches using Brillouin OTDR for measurement of Brillouin frequency shift distribution in optical fibers while the claimed invention uses Brillouin effect for detecting disconnection. However, the difference is the intended use of the apparatus and does not carry patentability weight. Furthermore, Shimizu et al. teaches in FIG. 9 that the apparatus of FIG. 3 can be used for measurement fiber length. Note the abrupt drop in Brillouin backscattered power at the end of the fiber. That is, FIG. 3 also measures the disconnection of the fiber. One of ordinary skill in the art would have been motivated to combine the teaching of FIG. 9 with the apparatus of FIG. 3 to measure disconnection of an optical transmission line because measuring the point of disconnection allows craftsperson to fix the transmission line at the location without replacing

Art Unit: 2613

the whole transmission line. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Brillouin OTDR for measuring disconnection, as taught by FIG. 9, in the apparatus of FIG. 3 of Shimizu et al. to measure disconnection of an optical transmission line because measuring the point of disconnection allows craftsperson to fix the transmission line at the location without replacing the whole transmission line.

8. Claims 2-4, 11-13, 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. (K. Shimizu et al., "Coherent Self-Heterodyne Brillouin OTDR for Measurement of Brillouin Frequency Shift Distribution in Optical Fibers", Journal of Lightwave Technology, Vol. 12, No. 5, May 1994) in view of admission (admitted prior art).

Shimizu et al. has been discussed above in regard to claims 1, 10, 19-20, 26-28, 30-32 and 34- 36. Regarding claims 2, 11 and 21, the difference between Shimizu et al. and the claimed invention is that Shimizu et al. does not teach reducing the power when detector detects a disconnection. Instant specification admits on page 1, paragraph [004] that for safety reason, when a disconnection is detected, the optical output is suspended or reduced. One of ordinary skill in the art would have been motivated to combine the teaching of admission with the modified Brillouin OTDR system of Shimizu et al. and reduce output optical power level when a detector detects disconnection due to eye safety of craftsperson. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to reduce output optical power level when a detector detects disconnection, as taught by admission, in the modified Brillouin OTDR system of Shimizu et al. due to eye safety regulation for craftsperson.

Art Unit: 2613

Regarding claims 3-4, 12-13 and 22-23, FIG. 1 (prior art) teaches amplifier 17A and variable optical attenuator 16A for controlling power level. Shimizu et al. teaches in FIG. 3 EDFAs for control power level.

9. Claims 26-28, 30-32, 34-36, 38-40, 42-44 and 46-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida (U.S. Patent 5,767,956).

Regarding claims 26 and 30, Yoshida teaches in FIG. 2 a Brillouin OTDR apparatus comprising an optical pulse generator 20 for transmitting light pulses and a reflection light detector 30. The difference between Yoshida and the claimed invention is that Yoshida teaches to use the apparatus for anticipating a fracture instead of detecting disconnection. However, Yoshida teaches in col. 1, lines 18-42 that an OTDR can also be used for detecting fracture. One of ordinary skill in the art would have been motivated to combine the teaching of in col. 1, lines 18-42 with the Brillouin OTDR apparatus because sometimes disconnection happens suddenly, for example, when a fiber cable is damaged by someone digging the ground. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to also use the Brillouin OTDR apparatus of Yoshida for detecting disconnection, as taught by col. 1, lines 18-42, because sometimes disconnection happens suddenly, for example, when a fiber cable is damaged by someone digging the ground.

Regarding claims 27 and 31, Yoshida teaches in FIG. 3 to send optical signal through the transmission line in the same direction.

Regarding claims 28, 32, it is well known in the art that optical signals can have different wavelengths.

Art Unit: 2613

Regarding claims 34 and 38, a Stokes component is the same as backward propagating SBS signal. See, e.g., Matthews et al. (U.S. Patent 7,127,182 B2), col. 2, lines 6-10.

Regarding claims 35 and 39, Yoshida teaches in FIG. 3 to send optical signal through the transmission line in the same direction.

Regarding claims 36 and 40, it is well known in the art that optical signals can have different wavelengths.

Regarding claims 42 and 46, the frequency of the Brillouin scattered pulse is down converted (has a lower frequency). See, e.g., Shimizu et al., page 730, right col., last paragraph.

Regarding claims 43 and 47, Yoshida teaches in FIG. 3 to send optical signal through the transmission line in the same direction.

Regarding claims 44 and 48, it is well known in the art that optical signals can have different wavelengths.

10. Claims 29, 33, 37, 41, 45 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida (U.S. Patent 5,767,956) in view of admission (admitted prior art).

Yoshida has been discussed above in regard to claims 26-28, 30-32, 34-36, 38-40, 42-44 and 46-48. The difference between Yoshida and the claimed invention is that Yoshida does not teach reducing the power when detector detects a disconnection. Instant specification admits on page 1, paragraph [004] that for safety reason, when a disconnection is detected, the optical output is suspended or reduced. One of ordinary skill in the art would have been motivated to combine the teaching of admission with the modified Brillouin OTDR system of Yoshida and reduce output optical power level when a detector detects disconnection due to eye safety of craftsman. Thus it would have been obvious to one of ordinary skill in the art at the time the

Art Unit: 2613

invention was made to reduce output optical power level when a detector detects disconnection, as taught by admission, in the modified Brillouin OTDR system of Yoshida due to eye safety regulation for craftsperson.

Allowable Subject Matter

11. Claims 5-9, 14-18 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. Claims 25 allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (8:30 a.m. - 5:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2613

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

skl

19 February 2007



Shi K. Li
Patent Examiner